

Amended Claims as submitted in Amendment filed on 04/20/2005:

1. (Previously Presented) A method of cleaning and drying one or more workpieces, comprising the steps of:

immersing the workpiece in an aqueous solution in a process vessel;

providing sonic agitation into the aqueous solution;

delivering an organic vapor or aerosol to a region above a surface of the aqueous solution to create a reduced surface tension at the surface of the aqueous solution;

raising the workpiece out of the aqueous solution at a controlled rate, after delivering the organic vapor or aerosol to the region above the surface of the aqueous solution, and causing a liquid-vapor or aerosol interface to pass across the workpiece surface, pulling aqueous solution off of the workpiece, to dry the workpiece; and

continuing sonic agitation while the liquid-vapor or aerosol interface passes across the workpiece surface.

2. (Previously Presented) The method of claim 1 further comprising the step of irradiating the workpiece, with electromagnetic radiation.

3. (Previously Presented) The method of claim 1 further comprising the step of delivering the organic vapor or aerosol with a carrier gas.

4. (Original) The method of claim 1, further comprising the step of controlling the temperature of the aqueous solution.

5. (Original) The method of claim 1 wherein the workpiece are held in a vertical orientation.

6. (Original) The method of claim 1 wherein the sonic agitation is provided to the workpiece through the aqueous solution from one or more sonic transducers on a surface of the process vessel.

7. (Original) The method of claim 1 wherein the controlled rate of raising is from 0.5 mm/s to 10 mm/s.

8. (Previously Presented) The method of claim 4 wherein the aqueous solution is provided at a temperature of 15° C to 30° C.

9. (Original) The method of claim 1 wherein the aqueous solution includes at least one additive selected from the group consisting of HF, HCl, H<sub>2</sub>O<sub>2</sub>, NH<sub>4</sub>OH, O<sub>3</sub>, and H.

10. (Previously Presented) The method of claim 1 wherein the organic vapor or aerosol is selected from the group consisting of isopropyl alcohol, methanol, and acetone.

11. (Original) The method of claim 1 further comprising the step of continuously delivering fresh aqueous solution to the process vessel to continually refresh the surface of the aqueous solution.

12. (Original) The method of claim 1 further comprising the step of supporting multiple workpieces in the process vessel.

13.-20. (Cancelled)

21. (Previously Presented) A method of processing a workpiece, comprising the steps of:

immersing the workpiece in an aqueous liquid in a process vessel;  
providing sonic agitation to a surface of the workpiece;

delivering a vapor or aerosol of an organic solvent onto a surface of the aqueous liquid to create a reduced surface tension at the surface of the aqueous liquid;

removing the workpiece from the aqueous liquid at a controlled rate such that a liquid-vapor or aerosol interface at the surface of the aqueous liquid passes across the workpiece surface and pulls any aqueous liquid remaining on the workpiece off of the workpiece; and

continuing sonic agitation while the liquid-vapor or aerosol interface passes across the workpiece surface.

22. (Previously Presented) The method of claim 21 further comprising the step of irradiating the workpiece, with electromagnetic radiation.

23. (Previously Presented) The method of claim 21 further comprising the step of delivering the organic vapor with a carrier gas.

24. (Previously Presented) The method of claim, 21 further comprising the step of controlling the temperature of the aqueous solution.

25. (Previously Presented) The method of claim 21 wherein the workpieces are held in a vertical orientation.

26. (Previously Presented) The method of claim 21 wherein the sonic agitation is provided to the workpiece through the aqueous solution from one or more sonic transducers on a surface of the process vessel.

27. (Previously Presented) The method of claim 21 wherein the organic solvent has a density less than the density of the aqueous solution.

28. (Previously Presented) The method of claim 21 wherein the organic solvent is selected from the group consisting of isopropyl alcohol, methanol, and acetone.

29. (Previously Presented) The method of claim 21 further comprising the step of continuously delivering fresh aqueous solution to the process vessel to continually refresh the surface of the aqueous solution.

30. (Previously Presented) The method of claim 21 further comprising the step of pressurizing an interior region of the vessel.

31. (Previously Presented) A method of processing a workpiece, comprising the steps of:

immersing the workpiece into a bath of an aqueous solution in a process vessel;

sonically agitating the workpiece;

removing the workpiece from the bath of aqueous solution at a controlled rate, with a surface film of the aqueous solution on the workpiece;

dissolving a gas, aerosol or vapor into the surface film of the aqueous liquid, causing the surface film of the aqueous liquid on the workpiece to be pulled into the bath of aqueous liquid, thereby leaving the workpiece substantially dry; and

continuing to sonically agitate the workpiece while removing the workpiece from the aqueous solution.

32. (Previously Presented) The method of claim 31 wherein the workpiece is sonically agitated by transmitting sonic energy from a transducer in the vessel, through the aqueous solution and to the surface of the workpiece.

33. (Previously Presented) The method of claim 31 wherein the step of reducing the surface tension includes delivering IPA into the vessel.

34. (Previously Presented) A method of cleaning and drying one or more workpieces in a single process vessel, comprising the steps of:

placing the workpieces into a bath of an aqueous solution in the process vessel;

providing sonic energy to the aqueous solution;

reducing the surface tension of the aqueous solution at the surface of the aqueous solution using a vapor or aerosol of isopropyl alcohol, methanol, or acetone;

removing the workpieces from the aqueous solution at a controlled rate, after reducing the surface tension of the aqueous solution and causing aqueous solution on the workpieces to be pulled into the bath and leaving the workpieces substantially dry as they are removed from the bath of aqueous liquid; and

continuing to provide sonic energy to the aqueous solution, while removing the workpieces from the aqueous solution.

35. (Previously Presented) A method of cleaning and drying one or more workpieces, comprising the steps of:

immersing the workpiece in an aqueous solution in a process vessel;

providing sonic agitation into the aqueous solution;

delivering an organic vapor or aerosol to a region above a surface of the aqueous solution to create a reduced surface tension at the surface of the aqueous solution;

raising the workpiece out of the aqueous solution at a controlled rate, and with the reduced surface tension at the surface of the aqueous solution pulling aqueous solution off of the workpiece surface, to dry the surface; and

continuing sonic agitation while the workpiece is raised out of the aqueous solution.